

Supplementary Material

Competencies of hospital managers - a systematic scoping review

Costase Ndayishimiye, Katarzyna Dubas-Jakóbczyk, Anastasia Holubenko, Alicja Domagała

* Correspondance: Katarzyna Dubas-Jakóbczyk: Katarzyna.Dubas@uj.edu.pl

SUPPLEMENTARY TABLES

Supplementary Table S1. Search terms for the databases.

| Topic | Search terms |
|-------------------------|--|
| hospital manager | “hospital manager*” OR “hospital management” OR “hospital director*” OR “hospital administrator*” OR “hospital president*” OR “hospital leader*” OR “hospital executive*” OR “health care manager*” OR “healthcare manager*” OR “health services manager*” OR “healthcare administrator*” OR “health services administrator*” OR “health care administrator*” OR “healthcare director*” OR “health services director*” |
| competencies | competenc* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise |

Supplementary Table S2. List of hand-searched organizations and journals, their websites and search dates.

| Nº | Organization/Journal | Website | Search Date |
|-----------|---|---|--------------------|
| 1 | The European Association of Hospital Managers (EAHM) | https://eahm.eu.org/ | 30.06.2022 |
| 2 | The European Hospital and Healthcare Federation (HOPE) | https://hope.be/ | 30.06.2022 |
| 3 | The European Health Management Association (EHMA) | https://ehma.org/ | 30.06.2022 |
| 4 | American Hospital Association (AHA) | https://www.aha.org/ | 30.06.2022 |
| 5 | Journal of Healthcare Leadership | https://www.dovepress.com/journal-of-healthcare-leadership-journal | 30.06.2022 |
| 6 | The Health Care Manager (HCM) Journal | https://journals.lww.com/healthcaremanagerjournal/pages/default.aspx | 30.06.2022 |
| 7 | International Hospital Federation (IHF) | https://www.ihf-fih.org/ | 01.07.2022 |
| 8 | Journal of Health Organization and Management/Health Care Management Review | https://www.dovepress.com/journal-of-healthcare-leadership-journal | 01.07.2022 |
| 9 | Health Services Management Research. | https://journals.sagepub.com/home/hsm | 02.07.2022 |

| | | | |
|----|---|---|------------|
| 10 | Australasian College of Health Service Management. | https://www.achsm.org.au/ | 06.07.2022 |
| 11 | Institute of Health & Social Care Management | https://ihm.org.uk/about-us/ | 10.07.2022 |
| 12 | The American Association of Healthcare Administrative Management (AAHAM) | https://www.aaham.org/ | 10.07.2022 |
| 13 | American College of Healthcare Executives (ACHE) | https://www.ache.org/ | 10.07.2022 |
| 14 | American Health Information Management Association (AHIMA) | https://www.ahima.org/ | 10.07.2022 |
| 15 | The Healthcare Financial Management Association (HFMA) | https://www.hfma.org/ | 10.07.2022 |
| 16 | Medical Group Management Association (MGMA) | https://www.mgma.com/ | 10.07.2022 |

Supplementary Table S3. Data Extraction Form.

| Research question | Data to be extracted | Coding examples |
|-------------------|-----------------------------|---|
| RQ1 | authors/title | N/A |
| | year of publication | <ul style="list-style-type: none"> • 2000 –2005 • 2006 – 2010 • 2011-2015 • after 2015 |
| | research country | N/A (list of countries) |
| | language of the publication | <ul style="list-style-type: none"> • English |
| RQ2 | type of publication | <ul style="list-style-type: none"> • empirical study <ul style="list-style-type: none"> ○ secondary data (review) vs primary data (quantitative vs qualitative vs mixed methods) • theoretical paper • technical report • formal guidelines |
| RQ3 | focus of publication | <ul style="list-style-type: none"> • type/classification of competencies • measurement of competencies • association between competencies and hospital outcomes |
| RQ4 | Methods applied | <ul style="list-style-type: none"> • quantitative (e.g., questionnaire) • qualitative (e.g., interviews, Delphi-study) • mixed |
| RQ5 | Results/conclusions | <ul style="list-style-type: none"> • results achieved/conclusions stated |

Supplementary Tables S4-S10. Search results per database:

Database 1: ABI/INFORM

Date of the search: 17/06/2022

| Query | Results |
|--|---------|
| ab("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR | 985 |

| | |
|---|--|
| "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND ab(competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise) | |
|---|--|

Database 2: Business Source Complete

Date of the search: 20/06/2022

| Query | Results |
|--|---------|
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* ... | 494 |
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* ... | 511 |
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* ... | 593 |

Database 3: CINAHL Complete

Date of the search: 17/06/2022

| Query | Results |
|--|---------|
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise) | 1,085 |

Database 4: PsycInfo

Date of the search: 20/06/2022

| Query | Results |
|--|---------|
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* .. | 502 |
| AB ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND AB (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* ... | |

Database 5: PubMed

Date of the search: 17/06/2022

| Query | Results |
|--|---------|
| ("hospital manager*" [Title/Abstract] OR "hospital management" [Title/Abstract] OR "hospital director*" [Title/Abstract] OR "hospital administrator*" [Title/Abstract] OR "hospital president*" [Title/Abstract] OR "hospital leader*" [Title/Abstract] OR "hospital executive*" [Title/Abstract] OR "health care manager*" [Title/Abstract] OR "healthcare manager*" [Title/Abstract] OR "health services manager*" [Title/Abstract] OR "healthcare administrator*" [Title/Abstract] OR "health services administrator*" [Title/Abstract] OR "health care administrator*" [Title/Abstract] OR "healthcare director*" [Title/Abstract] OR "health services director*" [Title/Abstract]) AND (competence* [Title/Abstract] OR skill* [Title/Abstract] OR abilit* [Title/Abstract] OR attitude* [Title/Abstract] OR knowledge [Title/Abstract] OR qualification* [Title/Abstract] OR capacit* [Title/Abstract] OR capabilit* [Title/Abstract] OR expertise [Title/Abstract]) Filters: Full text, English, from 2000 – 2022 | 1,900 |

Database 6: Scopus

Date of the search: 18/06/2022

| Query | Results |
|---|---------|
| ("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR "health services director*") AND TITLE-ABS (competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "bk")) AND (LIMIT-TO (LANGUAGE , "English")) | 2,825 |

Database 7: Web of Science

Date of the search: 17/06/2022

| Query | Results |
|-------|---------|
|-------|---------|

| | | | |
|----------------------------|---|-----------|-------|
| <input type="checkbox"/> 6 | #2 AND #1 and 2000 or 2001 or 2002 or 2003 or 2004 or 2005 or 2006 or 2007 or 2008 or 2009 or 2011 or 2012 or 2013 or 2014 or 2015 or 2016 or 2017 or 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Articles or Review Articles or Book Chapters (Document Types) and English (Languages) | 1,973 | 1,973 |
| <input type="checkbox"/> 5 | #2 AND #1 and 2000 or 2001 or 2002 or 2003 or 2004 or 2005 or 2006 or 2007 or 2008 or 2009 or 2011 or 2012 or 2013 or 2014 or 2015 or 2016 or 2017 or 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Articles or Review Articles or Book Chapters (Document Types) | 2,083 | |
| <input type="checkbox"/> 4 | #2 AND #1 and 2000 or 2001 or 2002 or 2003 or 2004 or 2005 or 2006 or 2007 or 2008 or 2009 or 2011 or 2012 or 2013 or 2014 or 2015 or 2016 or 2017 or 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) | 2,255 | |
| <input type="checkbox"/> 3 | #2 AND #1 | 2,440 | |
| <input type="checkbox"/> 2 | (TI=(competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise)) OR AB=(competence* OR skill* OR abilit* OR attitude* OR knowledge OR qualification* OR capacit* OR capabilit* OR expertise) | 6,248,791 | |
| <input type="checkbox"/> 1 | (TI=("hospital manager*" OR "hospital management" OR "hospital director*" OR "hospital administrator*" OR "hospital president*" OR "hospital leader*" OR "hospital executive*" OR "health care manager*" OR "healthcare manager*" OR "health services manager*" OR "healthcare administrator*" OR "health services administrator*" OR "health care administrator*" OR "healthcare director*" OR | 9,356 | |

Supplementary Table S11. A list of the included 57 studies—full reference, publication year, country & study type.

| No | Full reference | Year of Publication | Country | Publication type |
|----|---|---------------------|-----------|------------------------|
| 1 | Abdi, Z. et al. (2022) ‘Role of hospital leadership in combating the COVID-19 pandemic.’, <i>Health services management research</i> , 35(1), pp. 2–6. doi: 10.1177/09514848211035620. | 2022 | Iran | empirical |
| 2 | Aini, Q. (2018) ‘Management skill and leadership: A case study from Hospital managers of charity business in health’, <i>Journal of Social Sciences Research</i> , 4(12), pp. 478–482. doi: 10.32861/jssr.412.478.482. | 2018 | Indonesia | empirical |
| 3 | Aktan, T., & Sahin, B. (2021). Assessment of Relationship between Hospital Resource Management Capacity and Characteristics of Hospitals and Managers. <i>KONURALP TIP DERGISI</i> , 13(2), 299–311. https://doi.org/10.18521/ktd.912698 | 2021 | Turkey | empirical |
| 4 | Anderson P., Pulich M. (2002). Managerial Competencies Necessary in Today's Dynamic Health Care Environment. <i>The Health Care Manager (HCM) Journal</i> , 21(2), 1-11. | 2002 | US | other - Guidelines |
| 5 | Babinski P. J. (2016). The Perceived Importance of Role-Specific Competencies for Health Care Leaders Establishes the Need to Expand Role Theory. <i>The Health Care Manager (HCM) Journal</i> , 35(2), 164-179. https://journals.lww.com/healthcaremanagerjournal/Abstract/2016/04000/The_Perceived_Importance_of_Role_Specific.11.aspx | 2016 | US | empirical |
| 6 | Barati, O., Sadeghi, A., Khammaria, M., Siavashi, E., & Oskrochi, G. (2016). A Qualitative Study to Identify Skills and Competency Required for Hospital Managers. <i>Electronic Physician</i> , 8(6), 2458–2465. https://doi.org/10.19082/2458 | 2016 | Iran | empirical |
| 7 | Calhoun, J.G., Dollett, L., Sinioris, M.E., Wainio, J.A., Butler, P.W., Griffith, J.R. and Warden, G.L. (2008), “Development of an interprofessional competency model for healthcare leadership”, <i>Journal of Healthcare Management</i> , Vol. 53 No. 6, pp. 375-391. https://journals.lww.com/jhmonline/Citation/2008/11000/Development_of_an_Interprofessional_Competency.6.aspx | 2008 | US | other - Guidelines |
| 8 | Calhoun, J. G., Davidson, P. L., Sinioris, M. E., Vincent, E. T., & Griffith, J. R. (2002). Toward an understanding of competency identification and assessment in health care management. <i>Quality Management in Healthcare</i> , 11(1), 14–38. | 2002 | N/A | other – Review article |
| 9 | Collins S. K., Collins K. S. (2015). Leadership Characteristics for Health Care Managers: Perspectives of Chief Executive Officers in US Hospitals. <i>The Health Care Manager (HCM) Journal</i> , 34(4), 293-296. https://journals.lww.com/healthcaremanagerjournal/Abstract/2015/10000/Leadership_Characteristics_for_Health_Care.4.aspx | 2015 | US | empirical |
| 10 | Dadgar, E., Janati, A., Tabrizi, J. S., Asghari-Jafarabadi, M., & Barati, O. (2012). Iranian Expert Opinion about Necessary Criteria for Hospitals Management Performance Assessments. <i>Health Promotion Perspectives</i> , 2(2), 223–230. https://doi.org/10.5681/hpp.2012.027 | 2012 | Iran | empirical |
| 11 | Fanelli S., Pratici L., Zangrandi A. (2021). Managing healthcare services: Are professionals ready to play the role of manager? <i>Health Services Management Research</i> , 0(0), 1-11. https://journals.sagepub.com/doi/full/10.1177/09514848211010264 | 2021 | Italy | empirical |

| | | | | |
|----|--|------|-----------|---------------------|
| 12 | Flaig, J., Alam, A., Huynh, J., Reid-Hector, J., & Heuer, A. (2020). Examining How Formal Leadership Development Programs Positively Influence Hospital Leaders' Individual Competencies and Organizational Outcomes - An Evidence-Based Literature Review. <i>Journal of Healthcare Leadership</i> , 12, 69–83. https://doi.org/10.2147/JHL.S239676 | 2020 | N/A | other – Lit. review |
| 13 | Freed, D. H. (2017). Ten Core Competencies for Hospital Administrators. <i>Health Care Manager</i> , 36(2), 108–115. https://doi.org/10.1097/HCM.0000000000000154 | 2017 | US | other - Guidelines |
| 14 | Garman AN, Scribner L. Leading for quality in healthcare: development and validation of a competency model. <i>J Healthc Manage</i> . 2011;56(6):373-384. https://journals.lww.com/jhmonline/Abstract/2011/11000/Leading_for_Quality_in_Healthcare_Development_and.5.aspx | 2011 | US | empirical |
| 15 | Guo, K. L. (2003). An assessment tool for developing healthcare managerial skills and roles. <i>Journal of Healthcare Management / American College of Healthcare Executives</i> , 48(6), 367–376; discussion 376. | 2003 | USA | empirical |
| 16 | Hernandez S. R., O'Connor S. J. (2019). The Case for Healthcare Leader Competencies: Exploring the Evidence. International Hospital Federation (IHF). <i>World Hospitals and Health Services Journal</i> , 55(2), 12-15. https://www.ihf-fih.org/download_doc_file.php?doc=67886e31945e37a58b7293be58630d13 | 2019 | US | other – Lit. review |
| 17 | Howard P. F., Liang Z., Leggat S., Karimi L. (2018). Validation of a management competency assessment tool for health service managers. <i>Journal of Health Organization and Management</i> , 32(1), 113-134. https://www.emerald.com/insight/content/doi/10.1108/JHOM-08-2017-0223/full/html | 2018 | Australia | empirical |
| 18 | Jafari M., Nemati A., De Roodenbeke E. (2019). Competencies of Hospital Managers: Iran's Case Study. International Hospital Federation (IHF). <i>World Hospitals and Health Services Journal</i> , 55(2), 21-28. https://www.ihf-fih.org/download_doc_file.php?doc=5e8d76f7c4668ef88b08a31a692ee61c | 2019 | Iran | empirical |
| 19 | Kakemam, E., & Dargahi, H. (2019). The Competencies Gap in Hospital Management in Tehran, Iran: A Cross-sectional Survey. <i>JOURNAL OF HEALTH MANAGEMENT</i> , 21(4), 451–464. https://doi.org/10.1177/0972063419884412 | 2019 | Iran | empirical |
| 20 | Kakemam, E., Liang, Z., Janati, A., Arab-Zozani, M., Mohaghegh, B., & Gholizadeh, M. (2020). Leadership and Management Competencies for Hospital Managers: A Systematic Review and Best-Fit Framework Synthesis. <i>Journal of Healthcare Leadership</i> , 12, 59–68. https://doi.org/10.2147/JHL.S265825 | 2020 | N/A | other – Lit. review |
| 21 | Kakemam, E., Janati, A., Mohaghegh, B., Gholizadeh, M., & Liang, Z. M. (2021). Developing competent public hospital managers: a qualitative study from Iran. <i>INTERNATIONAL JOURNAL OF WORKPLACE HEALTH MANAGEMENT</i> , 14(2), 149–163. https://doi.org/10.1108/IJWHM-07-2020-0120 | 2021 | Iran | empirical |
| 22 | Kalhor, R., Tajnesaei, M., Kakemam, E., Keykaleh, M. S., & Kalhor, L. (2016). Perceived hospital managerial competency in Tehran, Iran: is there a difference between public and private hospitals? <i>The Journal of the Egyptian Public Health Association</i> , 91(4), 157–162. https://doi.org/10.1097/01.EPX.0000508180.48823.cd | 2016 | Iran | empirical |
| 23 | Khadka, D. K., Gurung, M., & Chaulagain, N. (2014). Managerial competencies—A survey of hospital managers' working in Kathmandu valley, Nepal. <i>Journal of Hospital Administration</i> , 3(1), 62–72. | 2014 | Nepal | empirical |
| 24 | Landry A.Y., Stowe M., Haefner J. (2012). Competency assessment and development among health-care leaders: results of a cross-sectional survey. <i>Health Services Management Research</i> , 25(2), 78-86. https://journals.sagepub.com/doi/full/10.1258/hsmr.2012.012012 | 2012 | US | empirical |
| 25 | Leggat, S. G. (2007). Teaching and learning teamwork: competency requirements for healthcare managers. <i>The Journal of Health Administration Education</i> , 24(2), 135–149. | 2007 | Australia | empirical |

| | | | | |
|----|---|------|-------------------|---------------------|
| 26 | Lehr, B., Ostermann, H., & Schubert, H. (2011). Competence-based demands made of senior physicians: an empirical study to evaluate leadership competencies. <i>Zeitschrift Fur Evidenz, Fortbildung Und Qualitat Im Gesundheitswesen</i> , 105(10), 723–733. https://doi.org/10.1016/j.zefq.2010.08.006 | 2011 | Germany | empirical |
| 27 | Liang Z, Howard P, Leggat S. 360° Management Competency Assessment: is our understanding adequate? <i>Asia Pacific Journal of Human Resources</i> (online since 2016,12 February). https://onlinelibrary.wiley.com/doi/10.1111/1744-7941.12108 | 2016 | Australia | empirical |
| 28 | Liang, Z. and Howard, P.F. (2010), “Competencies required by senior health executives in NSW, 1990-1999”, <i>Australian Health Review</i> , Vol. 34 No. 1, pp. 52-58. https://www.publish.csiro.au/AH/AH09571 | 2010 | Australia | empirical |
| 29 | Liang, Z., Howard, P., & Wollersheim, D. (2017). Assessing the Competence of Evidence-Informed Decision-Making Amongst Health Service Managers. <i>Asia Pacific Journal of Health Management</i> , 12(3), 16-23. https://doi.org/10.24083/apjhm.v12i3.53 | 2017 | Australia | empirical |
| 30 | Liang Z, Blackstock FC, Howard PF, et al. An evidence-based approach to understanding the competency development needs of the health service management workforce in Australia. <i>BMC Health Serv Res</i> . 2018;18(1):976. doi:10.1186/s12913-018-3760-z | 2018 | Australia | empirical |
| 31 | Liang, Z., Leggat, S. G., Howard, P. F., & Koh, L. (2013). What makes a hospital manager competent at the middle and senior levels? <i>Australian Health Review</i> , 37(5), 566–573. | 2013 | Australia | empirical |
| 32 | Liang, Z. et al. (2018) ‘Development and validation of health service management competencies.’, <i>Journal of health organization and management</i> , 32(2), pp. 157–175. doi: 10.1108/JHOM-06-2017-0120. | 2018 | Australia | empirical |
| 33 | Liang, Z., Howard, P., Wang, J., Xu, M., & Zhao, M. (2020). Developing senior hospital managers: does “one size fit all”? - evidence from the evolving Chinese health system. <i>BMC Health Services Research</i> , 20(1), 281. https://doi.org/10.1186/s12913-020-05116-6 | 2020 | China | empirical |
| 34 | MacKinnon, N.J., Chow, C., Kennedy, P.L., Persaud, D.D., Metge, C.J. and Sketris, I. (2004), “Management competencies for Canadian health executives: views from the field”, <i>Healthcare Management Forum</i> , Vol. 17 No. 4, pp. 15-20. https://journals.sagepub.com/doi/pdf/10.1016/S0840-4704%2810%2960624-2 | 2004 | Canada | empirical |
| 35 | Mahdavi, A., Ardabili, F. S., Kheirandish, M., Ebrahimpour, H., & Daryani, S. M. (2020). Presenting a Model of Managerial practical wisdom in Hospitals. <i>MANAGEMENT-POLAND</i> , 24(2), 20–48. https://doi.org/10.2478/manment-2019-0045 | 2020 | Iran | empirical |
| 36 | Malmoon, Z., Tourani, S., Maleki, M., & Jafari, M. (2020). Future competencies for hospital management in developing countries: Systematic review. <i>Medical Journal of the Islamic Republic of Iran</i> , 34, 15. https://doi.org/10.34171/mjiri.34.15 | 2020 | N/A | other – Lit. review |
| 37 | Martins, J. M., Isouard, G. ., Malik, A. M., & Freshman, B. (2022). Senior Manager Perceptions of The Human Dimension of Health Services Management: Australia and Brazil. <i>Asia Pacific Journal of Health Management</i> , 17(1). https://doi.org/10.24083/apjhm.v17i1.929 | 2022 | Australia, Brazil | empirical |
| 38 | Mehrnoosh, J., Maher, A., & Sheikhi, M. (2020). Transformational Management Properties among Managers of Private and Public Hospitals in Gonbad-e-Kavus City. <i>Journal of Medicine and Life</i> , 13(3), 362–370. https://doi.org/10.25122/jml-2018-0066 | 2020 | Iran | empirical |
| 39 | Messum, D. G., Wilkes, L. M., Jackson, D., & Peters, K. (2016). Employability Skills in Health Services Management: perceptions of recent graduates. <i>Asia Pacific Journal of Health Management</i> , 11(1), 25-34. | 2016 | Australia | empirical |
| 40 | Ogbonnia Godfry O, Chikezie N. managerial competency among hospital managers: does experience on the job matters. <i>J Soc Sci Manag Res</i> . 2018;4(3):88-103. | 2018 | Nigeria | empirical |

| | | | | |
|----|--|------|--------------|----------------------|
| 41 | Okonkwo, U., Ekpeyoung, B., Ndep, A., & Nja, G. (2020). Managerial competencies-A survey of healthcare managers in a tertiary hospital in Calabar, South-South Nigeria. <i>Nigerian Journal of Clinical Practice</i> , 23(7), 988–994. https://doi.org/10.4103/njcp.njcp_667_19 | 2020 | Nigeria | empirical |
| 42 | Patnaik SK, Gupta SK, Kant S, Pillay R. Analyzing Competencies of Indian Health Care Leaders: Way Forward for Next Generation. <i>Int J Res Foundation Hosp Healthc Adm</i> 2017;5(1):47-53. (1):47-53. | 2017 | India | empirical |
| 43 | Pillay, R. (2008). The skills gap in hospital management in the South African public health sector. <i>Journal of Public Health Management and Practice: JPHMP</i> , 14(5), E8-14. https://doi.org/10.1097/01.PHH.0000333890.68140.61 | 2008 | South Africa | empirical |
| 44 | Pillay, R. (2008). Managerial competencies of hospital managers in South Africa: a survey of managers in the public and private sectors. <i>Human Resources for Health</i> , 6, 4. https://doi.org/10.1186/1478-4491-6-4 | 2008 | South Africa | empirical |
| 45 | Pillay, R. (2008). Defining competencies for hospital management A comparative analysis of the public and private sectors. <i>LEADERSHIP IN HEALTH SERVICES</i> , 21(2), 99–110. https://doi.org/10.1108/17511870810870547 | 2020 | South Africa | empirical |
| 46 | Pillay, R. (2010) ‘The skills gap in hospital management: a comparative analysis of hospital managers in the public and private sectors in South Africa.’, <i>Health services management research</i> , 23(1), pp. 30–36. doi: 10.1258/hsmr.2009.009015. | 2010 | South Africa | empirical |
| 47 | Ramirez C. L., Ramirez B., Belendez A. H. (2019). Public-Private Partnerships (PPPs) in Healthcare: Gauging Leadership Competencies of Hospital Managers. <i>International Hospital Federation (IHF). World Hospitals and Health Services Journal</i> , 55(2), 29-33. https://www.ihf-fih.org/download_doc_file.php?doc=0ef175a70aaf679f918eb9a1629a518e | 2019 | Mexico | empirical |
| 48 | Selsor, W. (2021). Managerial competencies driving successful change initiatives: A multiple case study of healthcare administrators. In <i>Dissertation Abstracts International: Section B: The Sciences and Engineering (Vol. 82, Issues 4-B)</i> . ProQuest Information & Learning. | 2021 | US | other - Dissertation |
| 49 | Shewchuk RM, O’Connor SJ, Fine DJ. Building an understanding of the competencies needed for health administration practice. <i>Healthc Manage</i> . 2005; 50(1):32-47. https://pubmed.ncbi.nlm.nih.gov/15729906/ | 2005 | US | empirical |
| 50 | Shojaei, P., Mokhtari, P. and Rashvand, N. (2011) ‘Evaluation of managers competencies of teaching hospitals of Qazvin university of medical science based on 360° degree feed back 2010’, <i>World Applied Sciences Journal</i> , 13(1), pp. 60–65. | 2011 | Iran | empirical |
| 51 | Stefl, M. E. (2008). Common competencies for all healthcare managers: The healthcare leadership alliance model. <i>Journal of Healthcare Management</i> , 53(6), 360–373. https://doi.org/10.1097/00115514-200811000-00004 | 2008 | US | other - Guidelines |
| 52 | Toygar, S. A., & Akbulut, Y. (2013). Managerial Skills of Hospital Administrators: Case Study of Turkey. <i>Journal of Health Management</i> , 15(4), 579–594. https://doi.org/10.1177/0972063413516228 | 2013 | Turkey | empirical |
| 53 | Van Tuong, P., & Thanh, N. D. (2017). A leadership and managerial competency framework for public hospital managers in Vietnam. <i>AIMS Public Health</i> , 4(4), 418. | 2017 | Vietnam | empirical |
| 54 | Wallick, W. G., & Stager, K. J. (2002). Healthcare managers’ roles, competencies, and outputs in organizational performance improvement / Practitioner response. <i>Journal of Healthcare Management</i> , 47(6), 390–392. https://www.proquest.com/scholarly-journals/healthcare-managers-roles-competencies-outputs/docview/206729167/se-2?accountid=47074 | 2002 | USA | empirical |

| | | | | |
|----|---|------|----------|---------------------|
| 55 | Walsh, A. P., Harrington, D., & Hines, P. (2020). Are hospital managers ready for value-based healthcare? A review of the management competence literature. <i>INTERNATIONAL JOURNAL OF ORGANIZATIONAL ANALYSIS</i> , 28(1), 49–65. https://doi.org/10.1108/IJOA-01-2019-1639 | 2020 | N/A | other – Lit. review |
| 56 | Wongprasit N. The leadership competencies model of private hospital directors in Thailand. <i>HRD J.</i> 2014;4(1):72–85. | 2014 | Thailand | empirical |
| 57 | Lockhart W, Backman A, editors. Health care management competencies: identifying the GAPS. <i>Healthcare Management Forum</i> ; 2009: Elsevier. | 2009 | Canada | empirical |

Supplementary Table S12. Overview of the included literature review.

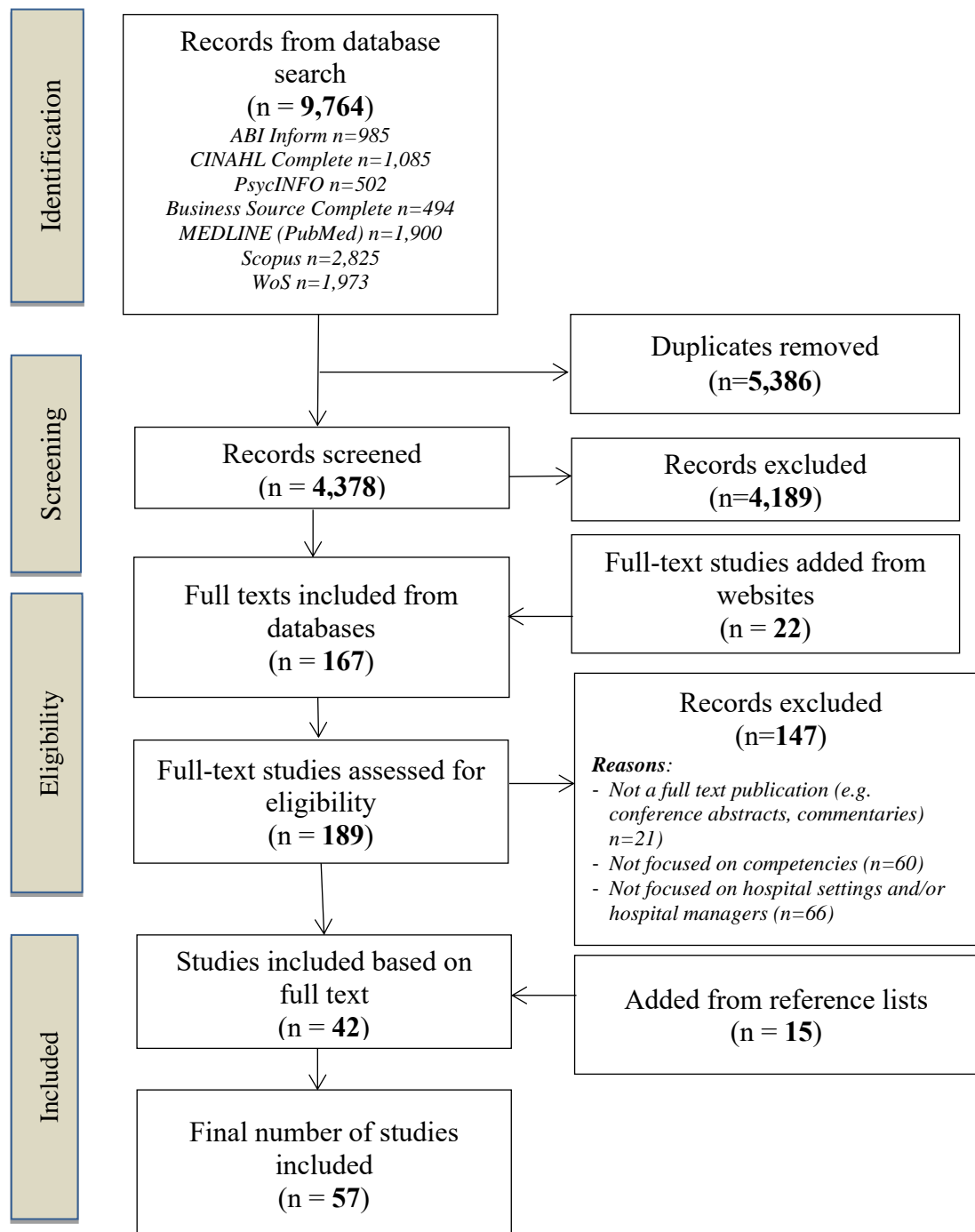
| No | Abbrev. | Review purpose/objective | Study topic ^a | Type of manager ^b | No. of studies included | Key findings: hospital manager's competencies, skills & behaviors | Main conclusions |
|----|-----------------------|--|--------------------------|------------------------------|-------------------------|---|--|
| 1 | Calhoun et al. (2002) | To facilitate discussions associated with competency modeling in health care management education by providing: (1) a summary of recent progress in competency identification for health management; (2) an historical overview on competency-based education and assessment; (3) a glossary of terms frequently used in discussions surrounding competency-based education and training; and (4) an outline of the key challenges and benefits associated with competency modeling. | T | S, M, N | Not stated | Goleman Competency Model —(technical, cognitive, and emotional intelligence); Competency Assessment Tool Approach —(industry knowledge; analytical and conceptual reasoning; and interpersonal and emotional intelligence); Accreditation Council For Graduate Medical Education —(patient care knowledge, practice-based learning and improvement, interpersonal and communication skills, etc.); Competency Clusters for Financial Health Care Roles —(business knowledge, make it happen (e.g., results orientation, etc.), and leading others); Skill Combinations Most Desired by Employers —(managing self, communicating, managing people and tasks, and mobilizing innovation and change); The Body of Knowledge for Medical Practice Management —(professionalism, leadership, communication skills, organizational and analytical skills, and technical skills); Healthcare Information and Management Systems Society —(General knowledge (e.g., health care, technology, etc.), system knowledge, and administration capabilities); American College of Healthcare Executives —(knowledge of governance and organizational structure, human resources, health care technology, quality and performance improvement, laws and ethics, Management and Business, etc.). | The role and responsibility of healthcare educators is to prepare future healthcare managers to cope in an ever-changing environment. It is therefore imperative that the essential management competencies for the future be identified and integrated into and across all training, education, and development curricula for the profession. Defining a broad set of competencies based on the well-documented needs of future healthcare executives will greatly facilitate communication and collaboration across all segments and organizations involved in the training and development of future healthcare leaders. |
| 2 | Flaig et al. (2020) | To understand how individual competencies and organizational outcomes are influenced when hospital managers and leaders | T, A | S, M | 23 | Hospital managers and leaders who attended a formal LDP revealed a variety of beneficial outcomes: gained management and leadership knowledge; increased confidence; improved communication skills; improved planning skills; increased self-awareness; teamwork; | For hospital managers and leaders who participate in formal LDPs, there can be a variety of positive outcomes. Executives should work to |

| | | | | | | | |
|---|-------------------------|--|---|---------|------------|---|--|
| | | <i>participate in a formal and structured leadership development program (LDP).</i> | | | | <i>problem-solving skills; ability to encourage others; knowledge of health care systems and processes; positive impact (patient satisfaction, etc.); ability to become a mentor/role model; gained financing/budget skills; improved networking skills; increased approachability; increased understanding of diversity, etc.</i> | <i>ensure that the LDP material is achieving the desired beneficial outcome for their organization.</i> |
| 3 | Hernandez et al. (2019) | <i>To explore the relationship between competent management of healthcare organizations and its effect on performance.</i> | A | S, M, N | Not stated | <i>Firstly, a relationship between management and leadership competence or behaviors and outcomes at the team or unit level has been documented. Secondly, eight recent research articles have identified the implications of leadership competencies for performance at the organizational level. Lastly, three large studies found a strong and positive link between leadership and management practices and hospital performance.</i> | <i>Research shows a positive link between strong health care management and improved performance outcomes in healthcare settings at the individual, team, organizational, and system levels. The findings support the assertion that better management can lead to improved performance in health-care settings.</i> |
| 4 | Kakemam et al. (2020) | <i>To synthesize the evidence related to the leadership and management competencies in healthcare organizations through the best-fit method.</i> | T | S, M | 12 | <i>Competencies and behavioural items generated a competency model for hospital managers (applicable in different healthcare contexts). This comprises seven core leadership and management competencies: evidence-informed decision-making; operations, administration, and resource management; knowledge of the healthcare environment and the organization; interpersonal, communication, and relationship management; leading people and organizations; enabling and managing change; and professionalism.</i> | <i>The review and mapping of the competencies identified in previous studies against the validated MCAP framework has resulted in the recommendation for an extended leadership and management competency framework for health service managers. It provides guidance for the formulation of training and development directions for the health service management workforce in a different healthcare context.</i> |

| | | | | | | | |
|---|----------------------|--|---|------|----|---|--|
| 5 | Malmoon et al (2020) | <i>To determine the future competencies of hospital managers in developing countries.</i> | T | S, M | 33 | <i>Core skills (communication skills, conflict and risk management, negotiation skills, change management, time and stress control, personnel management, identifying and solving problems, evidence-based decision making, operational planning, etc.); global knowledge (health economics, cultural management, policy analysis, patient rights, laws, business knowledge, etc.); key eligibility criteria (education, accreditation, accountability, socializations, needs assessment, research, planning and evaluation, etc.); and wide attitude (emotions management, trust and empathy, political awareness, bioethics, international attitudes, understanding the different kinds of incentives, etc.).</i> | <i>It is essential to explain the future competencies of hospital managers to improve efficiency and responsiveness to the changing role of hospitals. In addition to the core competencies that are necessary for management in the present and future, having a broad attitude towards global environmental and knowledge changes and management in the field of information and communication technology will be the most important competencies of a hospital administrator in the future.</i> |
| 6 | Walsh (2020) | <i>To undertake a systematic review of the available literature on managerial competencies in hospitals and consider these in a value-based health-care context.</i> | T | S, M | 22 | <i>Leadership (leadership skills and behavior, shaping culture, leading change); Hospital management and health-care environment (hospital organization and health-care system, human resource management, building patient and internal customer relationships); Business skills (evidence-based informed decision-making, operations management, process management and improvement, risk management, quality and safety, project management, and financial management); Relationship management (communication skills, conflict management); Professional ethics and social responsibility (professionalism, etc.); General management skills (time management, strategic thinking, effective planning, scheduling of tasks and activities).</i> | <i>The competency domains and sub-domains identified provide useful guidance for developing management competency models in hospitals operating in a value-based healthcare system, but if used, they would need to be refined further based on the specific requirements of the management level, the management role, and the area of clinical specialization.</i> |

SUPPLEMENTARY FIGURES

Supplementary Figure S1. The PRISMA of Results.



Supplementary Figure S2. Number of empirical studies by region and country

